

**Remarks**

**A. Pending Claims**

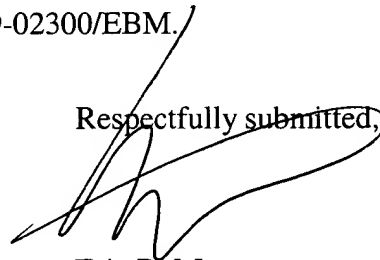
Claims 2117-2124, 2126-2162, 2164-2192, and 5396-5402 are currently pending. Claims 2117, 2149, 2156, 2158-2162, 2164-2166, 2178, 2181, 2185-2188, and 5398 have been amended to correct typographical errors and/or to clarify the claims.

**B. Additional Comments**

Applicant submits that all claims are in condition for allowance. Favorable reconsideration is respectfully requested.

A Fee Authorization in the amount of \$750.00 is enclosed to cover the Request for Continued Examination fee. If an extension of time is required, Applicant hereby requests the appropriate extension of time. If any additional fees are required or if any fees have been overpaid, please appropriately charge or credit those fees to Meyertons, Hood, Kivlin, Kowert & Goetzel, P.C. Deposit Account Number 50-1505/5659-02300/EBM.

Respectfully submitted,



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Reg. No. 34,876

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Date: 6-6-03

**Marked-Up Copy Of Amendments Submitted With**  
**Request For Continued Examination**

2117. (amended) A method of treating a hydrocarbon containing formation in situ, comprising:

providing heat from one or more heaters to at least a portion of the formation;  
allowing the heat to transfer from the one or more heaters to a part of the

formation;

controlling the heat such that an average heating rate of the part is less than about 1 °C per day in a pyrolysis temperature range of about 270 °C to about 400 °C;

wherein the part is heated in a reducing environment during at least a ~~portion~~some of the time that the part is being heated; and

producing a mixture from the formation.

2149. (amended) The method of claim 2117, further comprising:

producing hydrogen (H<sub>2</sub>) and condensable hydrocarbons from the formation; and

hydrogenating a portion of the produced condensable hydrocarbons with at least a ~~portion~~some of the produced hydrogen.

2156. (amended) A method of treating a hydrocarbon containing formation in situ, comprising:

heating a first section of the formation to produce a mixture from the formation;

heating a second section of the formation;

controlling the heat such that an average heating rate of the first section or the second section is less than about 1 °C per day in a pyrolysis temperature range of about 270 °C to about 400 °C; and

recirculating a portion of the produced mixture from the first section into the second section of the formation to provide a reducing environment within the second section of the formation.

2158. (amended) The method of claim 2156, wherein heating the first section or the second section comprises heating with at least one electrical heater.

2159. (amended) The method of claim 2156, wherein heating the first section or the second section comprises heating with at least one surface burner.

2160. (amended) The method of claim 2156, wherein heating the first section or the second section comprises heating with at least one flameless distributed combustor.

2161. (amended) The method of claim 2156, wherein heating the first section or the second section comprises heating with at least one natural distributed combustor.

2162. (amended) The method of claim 2156, further comprising controlling a pressure and a temperature within at least a majority of the first section or the second section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure.

2164. (amended) The method of claim 2156, wherein heating the first section or the second section comprises:

heating a selected volume ( $V$ ) of the hydrocarbon containing formation from one or more heaters, wherein the formation has an average heat capacity ( $C_v$ ), and wherein the heating pyrolyzes at least some hydrocarbons within the selected volume of the formation; and

wherein heating energy/day ( $P_{wr}$ ) provided to the selected volume is equal to or less than  $h \cdot V \cdot C_v \cdot \rho_B$ , wherein  $\rho_B$  is formation bulk density, and wherein an average heating rate ( $h$ ) of the selected volume is about 10 °C/day.

2165. (amended) The method of claim 2156, wherein heating the first section or the second section comprises transferring heat substantially by conduction.

2166. (amended) The method of claim 2156, wherein heating the first section or the

second section increases a thermal conductivity of at least a portion of the first section or the second section to greater than about 0.5 W/(m °C).

2178. (amended) The method of claim 2156, wherein the produced mixture comprises a non-condensable component, wherein the non-condensable component comprises hydrogen ( $H_2$ ), wherein the hydrogen is greater than about 10 % by volume of the non-condensable component at 25 °C and 1 atmosphere absolute pressure, and wherein the hydrogen is less than about 80 % by volume of the non-condensable component at 25 °C and 1 atmosphere absolute pressure.

2181. (amended) The method of claim 2156, further comprising controlling a pressure within at least a majority of the first section or the second section of the formation, wherein the controlled pressure is at least about 2.0 bar absolute.

2185. (amended) The method of claim 2156, further comprising:  
providing hydrogen ( $H_2$ ) to the first section or the second section to hydrogenate hydrocarbons within the first or second section; and  
heating a portion of the first section or the second section with heat from hydrogenation.

2186. (amended) The method of claim 2156, further comprising:  
producing hydrogen ( $H_2$ ) and condensable hydrocarbons from the formation; and  
hydrogenating a portion of the produced condensable hydrocarbons with at least a ~~portion~~some of the produced hydrogen.

2187. (amended) The method of claim 2156, wherein heating the first section or the second section increases a permeability of a majority of the first section or the second section to greater than about 100 millidarcy.

2188. (amended) The method of claim 2156, wherein heating the first section or the second section increases a permeability of a majority of the first section or the second

section such that the permeability of the majority of the first section or the second section is substantially uniform.

5398. (amended) A method of treating a hydrocarbon containing formation in situ, comprising:

heating a first section of the formation to produce a mixture from the formation;

heating a second section of the formation;

controlling a pressure and a temperature within at least a majority of the first section or the second section of the formation, wherein the pressure is controlled as a function of temperature, or the temperature is controlled as a function of pressure; and

introducing a portion of the produced mixture from the first section into the second section of the formation to provide a reducing environment within the second section of the formation.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.: 09/841,444  
Confirmation No.: 4543  
Filing Date: April 24, 2001  
Inventors: Wellington et al.  
Title: IN SITU THERMAL  
PROCESSING OF A  
HYDROCARBON  
CONTAINING FORMATION  
IN A REDUCING  
ENVIRONMENT

Examiner: G. A. Suchfield  
Art Unit: 3672  
Atty. Dkt. No.: 5659-02300/EBM

CERTIFICATE OF MAILING  
UNDER 37 C.F.R. §1.8  
DATE OF DEPOSIT: 6-6-03  
I hereby certify that this correspondence is being deposited with  
the United States Postal Service with sufficient postage as first  
class mail on the date indicated above and is addressed to:  
Commissioner for Patents  
Alexandria, VA 22313-1450  
Jackie L. Pitts

**FEE AUTHORIZATION**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

The Commissioner is hereby authorized to charge the following fees to Shell Oil Co.  
Deposit Account Number 19-1800/TH1948:


1. Request for Continued Examination fee	\$750.00
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**TOTAL AMOUNT:** **\$750.00**

The Commissioner is also authorized to charge any extension fee or other fees that may be necessary to the same account number. If the above-mentioned account is found to have insufficient funds, the Commissioner is authorized to charge Meyertons, Hood, Kivlin, Kowert & Goetzel, P.C. Deposit Account Number 50-1505/5659-02300/EBM.

Inventors: Wellington et al.  
Appl. Ser. No.: 09/841,444  
Atty. Dckt. No.: 5659-02300

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